Franklin WRF Modifications & Expansion

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Objectives

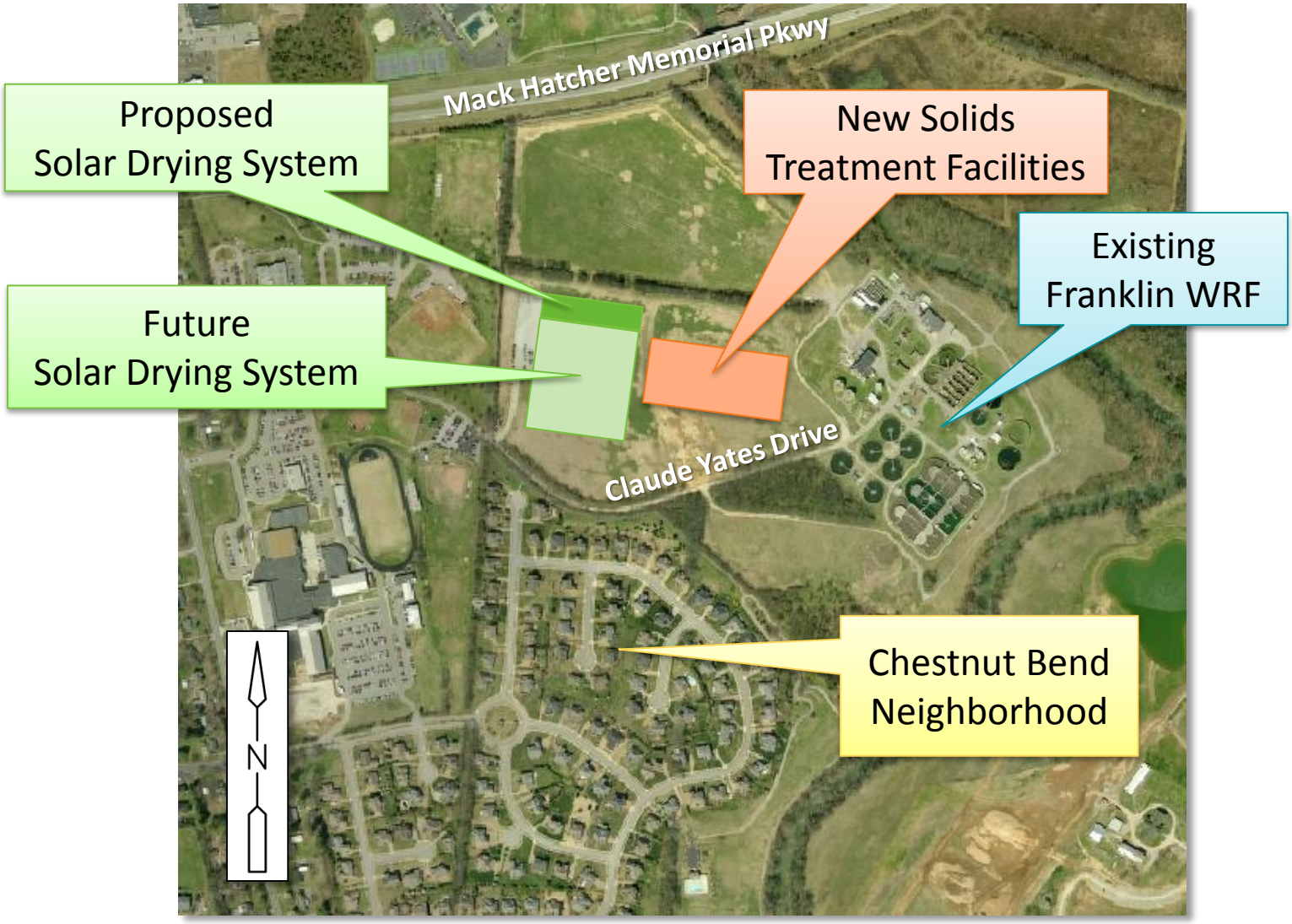
- Overview of the Franklin WRF Project
  - Project Goals
  - Site Layout
  - Odor Control Systems and Technologies
- Review of WEA Technical Memorandum
- Questions and Discussion

Franklin WRF Project Overview

Franklin WRF Project Overview

- Project Goals
  - Increase wastewater treatment capacity to 16 million gallons per day (mgd)
  - Continue to comply with new discharge permit
  - Replace aging solids treatment system
  - Provide for beneficial reuse of biosolids by the public

Franklin WRF Site Layout

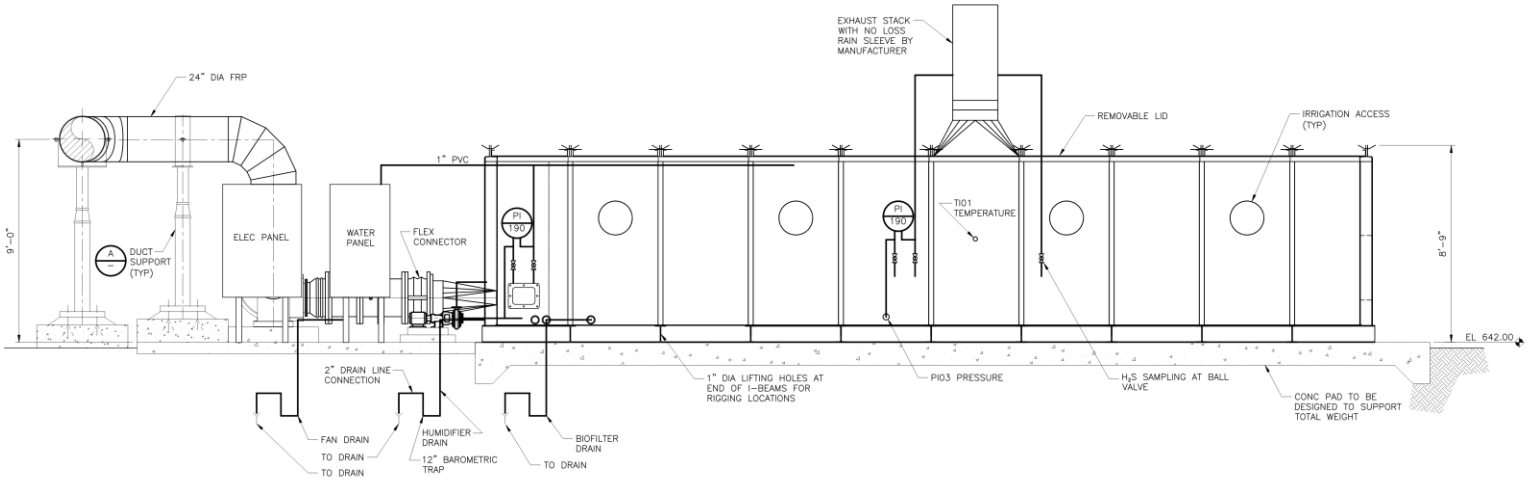


Potential Sources of Odor at Franklin WRF

- Upgraded Headworks
- New Flow Equalization Tank
- Upgraded Solids Treatment Facilities

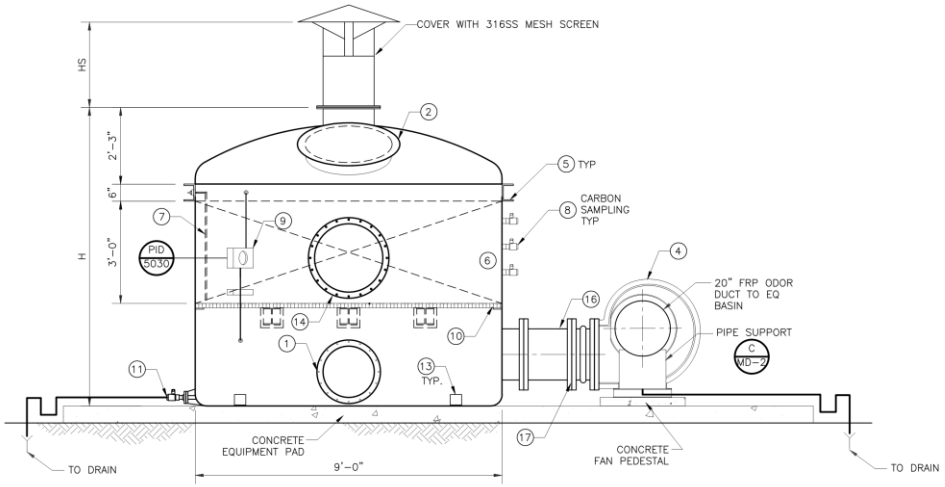
Headworks Odor Control System

- Headworks will be greatly improved in terms of capacity with a new dedicated odor control system
- Flow is routed through an enclosed, odor controlled structure
- Screenings from the flow are washed and deposited, also within the enclosed, odor controlled structure
- Biological treatment system (biofilter) (4,000 CFM capacity)
  - CBHOA/WEA Study – "…systems that have been designed for the HW and EQ appear to be adequate to prevent offsite odor detection…"

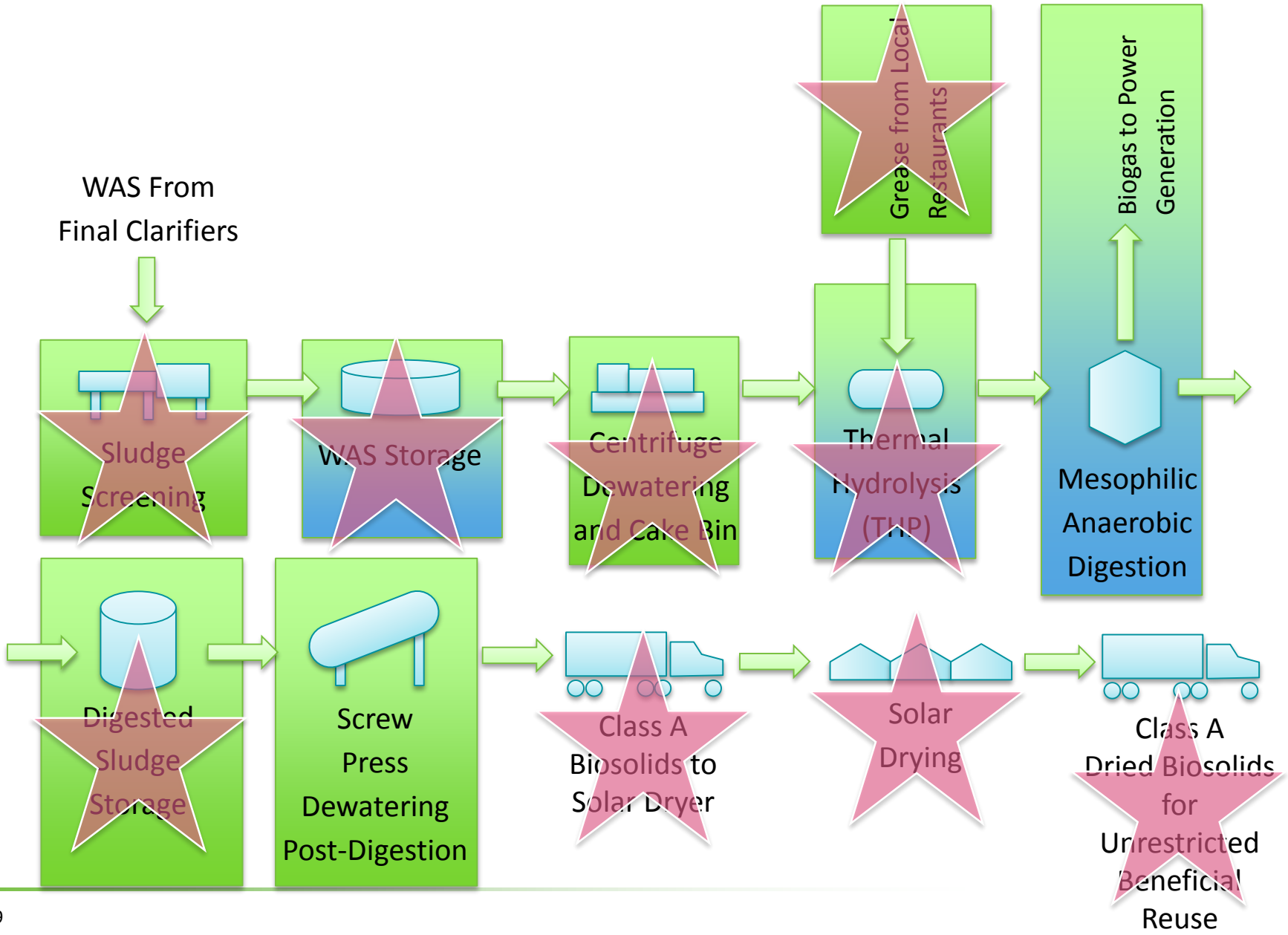


Equalization (EQ) Tank Odor Control System

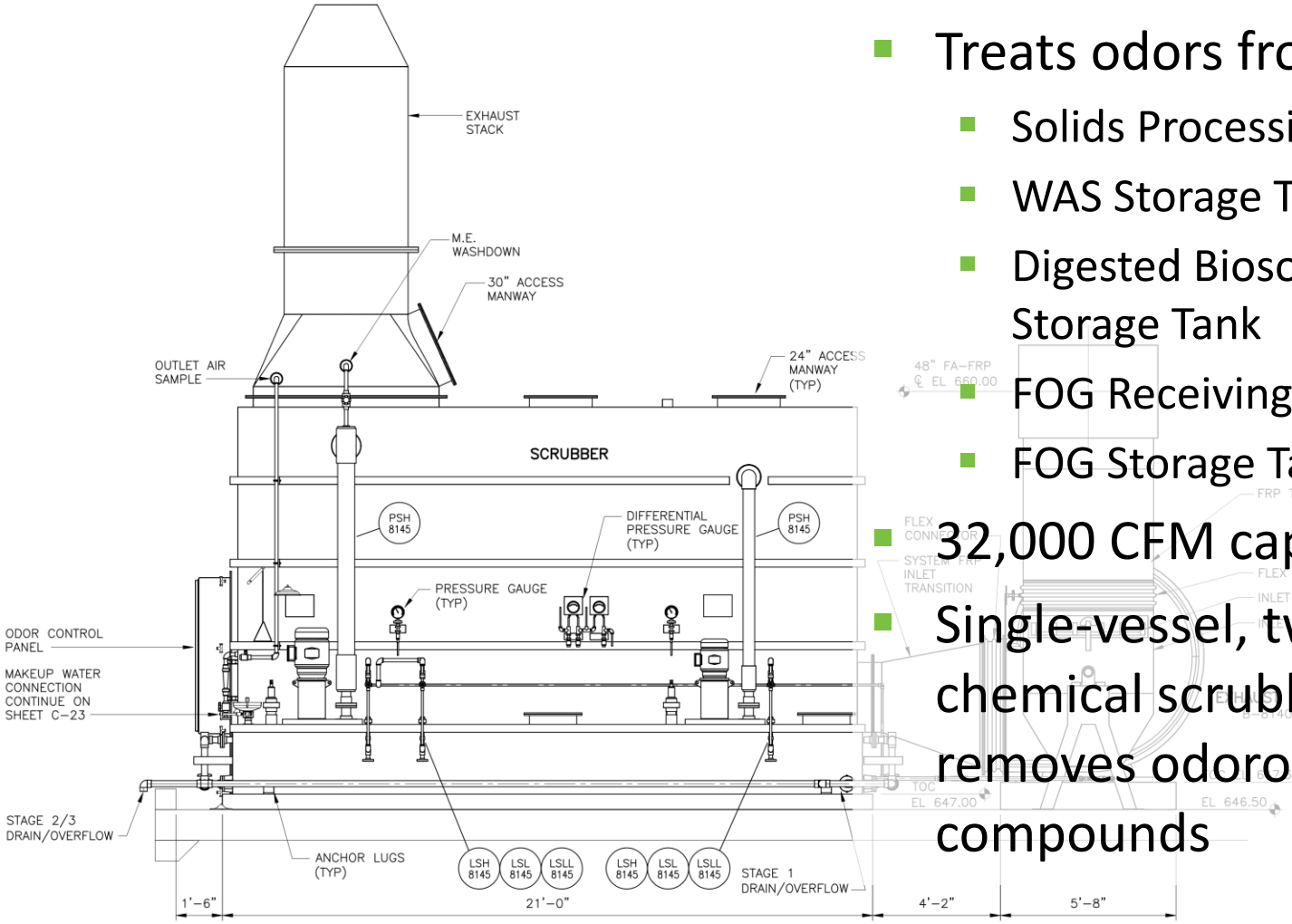
- The EQ Tank provides temporary storage during large storm events
- It is expected to be used approximately two to three times a year
- Odor control system includes high capacity activated carbon and permanganate media with 3,800 CFM / 1,400 CFM capacity (dual speed fan)
  - CBHOA/WEA Study – "…systems that have been designed for the HW and EQ appear to be adequate to prevent offsite odor detection…"



Franklin WRF Solids Process Flow Diagram



Solids Treatment Odor Control System



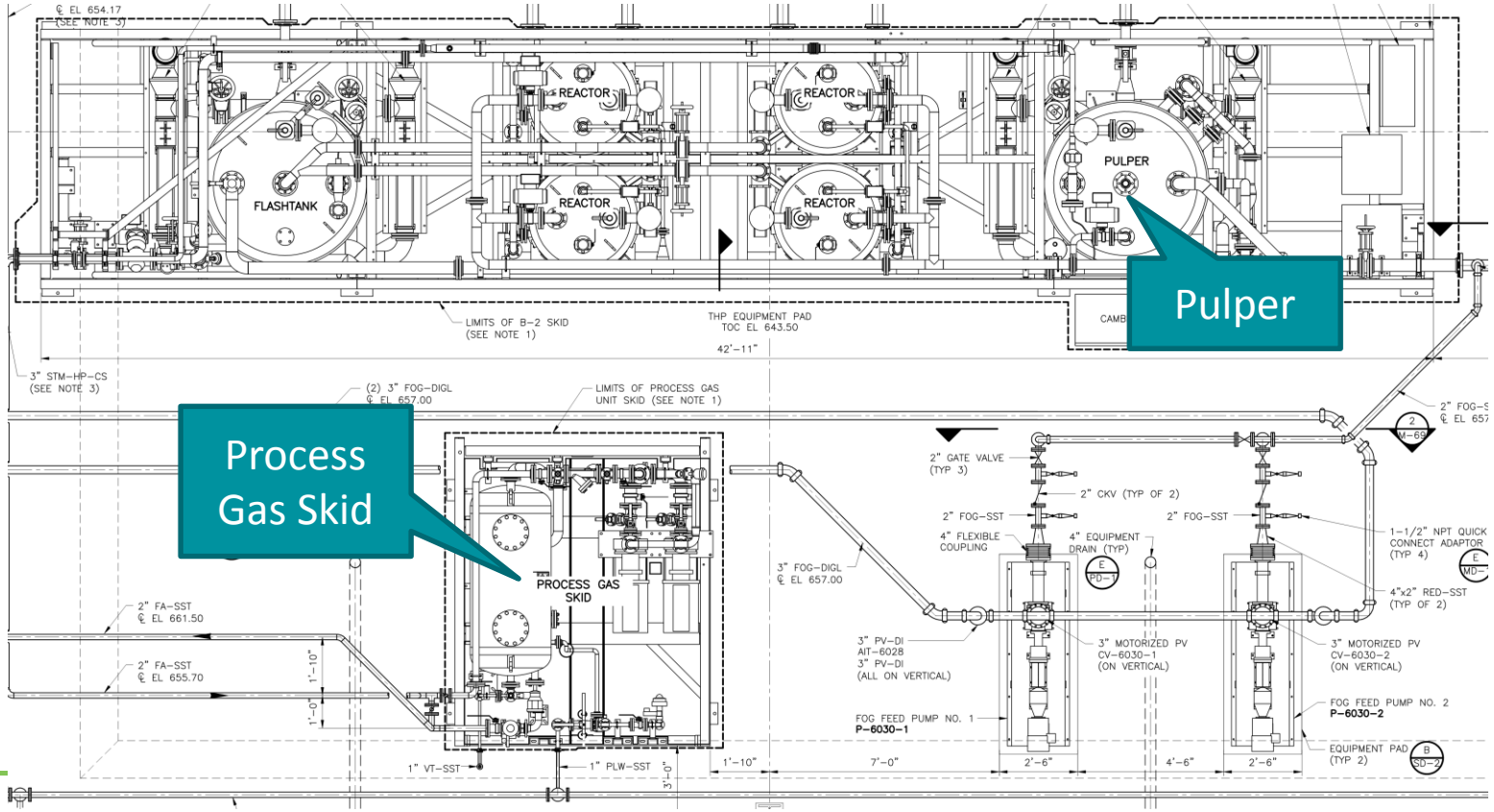
- Treats odors from:
  - Solids Processing Building
  - WAS Storage Tank
  - Digested Biosolids Storage Tank
  - FOG Receiving Station
  - FOG Storage Tanks
- 32,000 CFM capacity
- Single-vessel, two-stage chemical scrubber removes odorous sulfur compounds

Solids Treatment – Thermal Hydrolysis (THP)

- Identified in the City's Integrated Water Resource Plan as a long term solution to manage the City's Bio-solids over the next 30+ years.
- The reduction in bio-solid volume also results in a significant reduction in the size in other components of the treatment process. For example, the digester size is reduced 50-60% due to THP.
- Self-contained process on an open skid
(series of fully enclosed, high-pressure-rated tanks)
- Physical process in which sludge cake and fats, oils and grease (FOG) are hydrolyzed (conditioned) by exposing it to high pressure steam, followed by rapid pressure drop
- This process achieves Class A biosolids for unrestricted beneficial reuse
  - Complies with stringent EPA standards
  - Contains no detectable levels of pathogens
  - Can be used by the public and by farmers

Solids Treatment – Thermal Hydrolysis (THP) (cont.)

- Vapors from pulper go to process gas skid, then to digesters
- Process gas skid is a closed system, partly enclosed by canopy and the adjacent building
- Detectable odors are unlikely



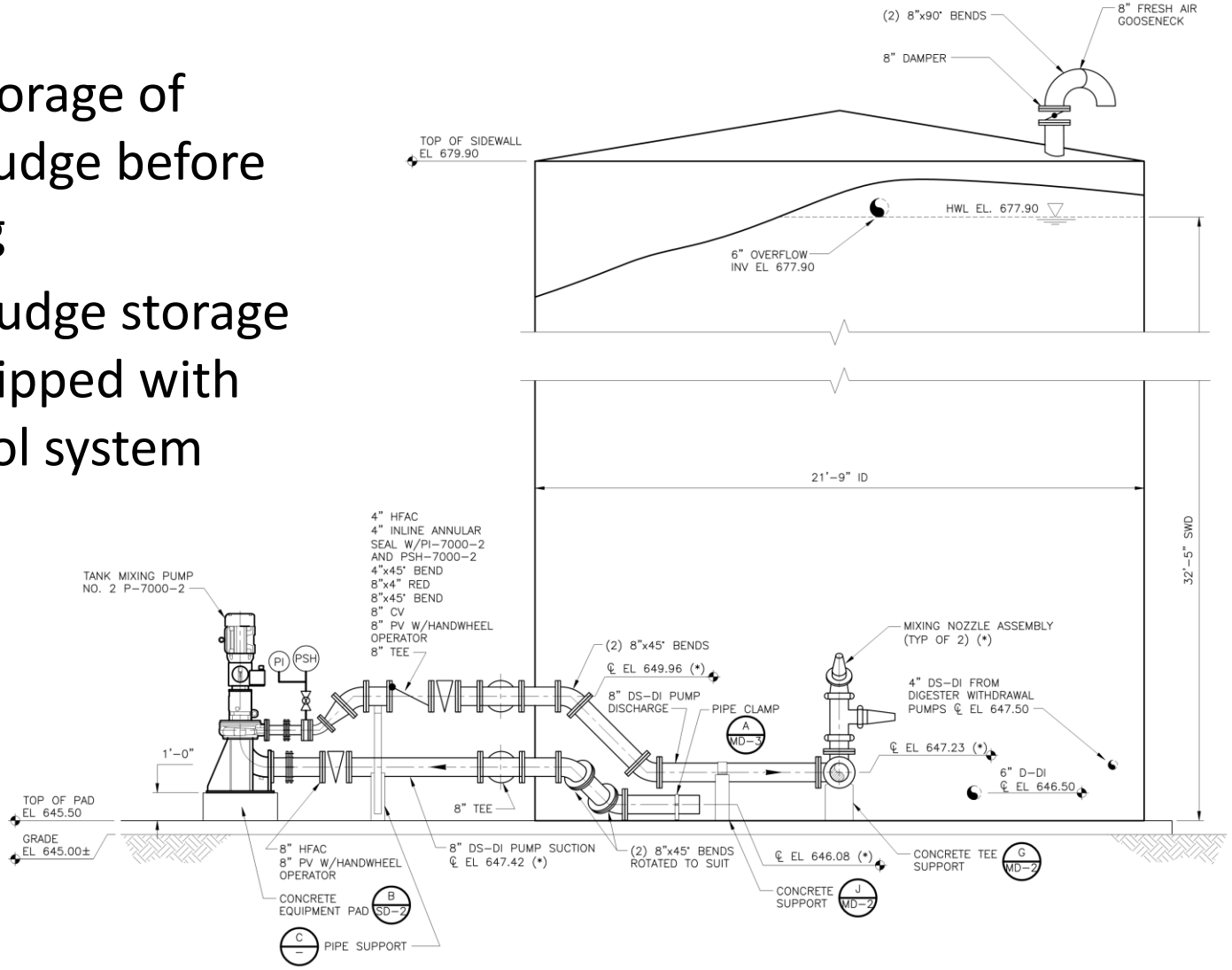
Solids Treatment – Thermal Hydrolysis (THP) (cont.)

Solids Treatment – Sludge Digestion

- Enclosed tanks where beneficial bacteria reduce solid matter, convert some of it to methane
- Methane-containing digester gas (biogas) is captured, processed and used for heating and power generation
(NO ONSITE STORAGE)
- Supporting equipment (pumps, heat exchangers) is enclosed
- No odor control is needed

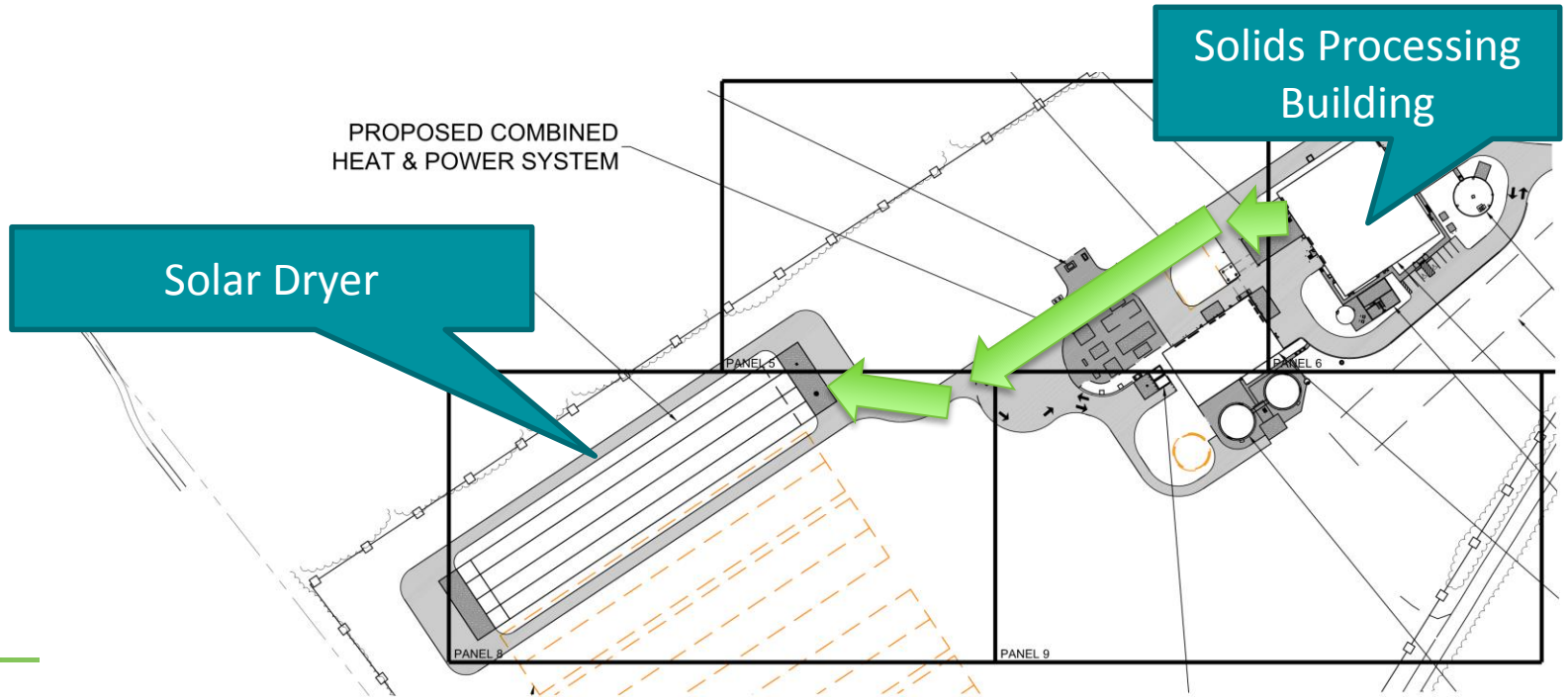
Solids Treatment – Digested Sludge Storage

- Provides storage of digested sludge before dewatering
- Digested sludge storage tank is equipped with odor control system



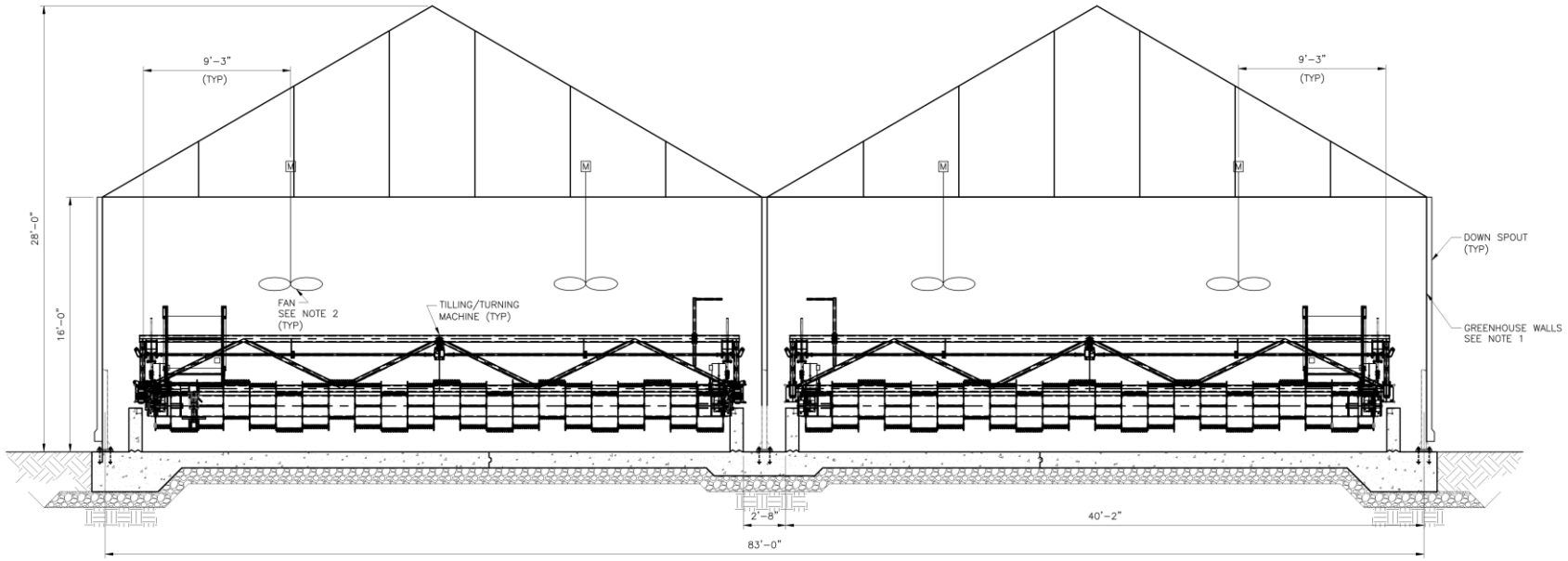
Solids Treatment – Solar Drying

- It is important to note that the solar dryers will be used to dry a Class A biosolids product with lower odor potential
- Dryers at other facilities handle unstabilized (odorous) product
- Trucks transport post-dewatered cake from the Solids Processing Building to the dryers
- Solar dryer unloading area is covered for protection from weather



Solids Treatment – Solar Drying (cont.)

- Machines automatically till the sludge, move it from one end of the dryer to the other
- Ventilation fans blow air down onto sludge, promote drying
- Dried solids have the consistency of dry soil

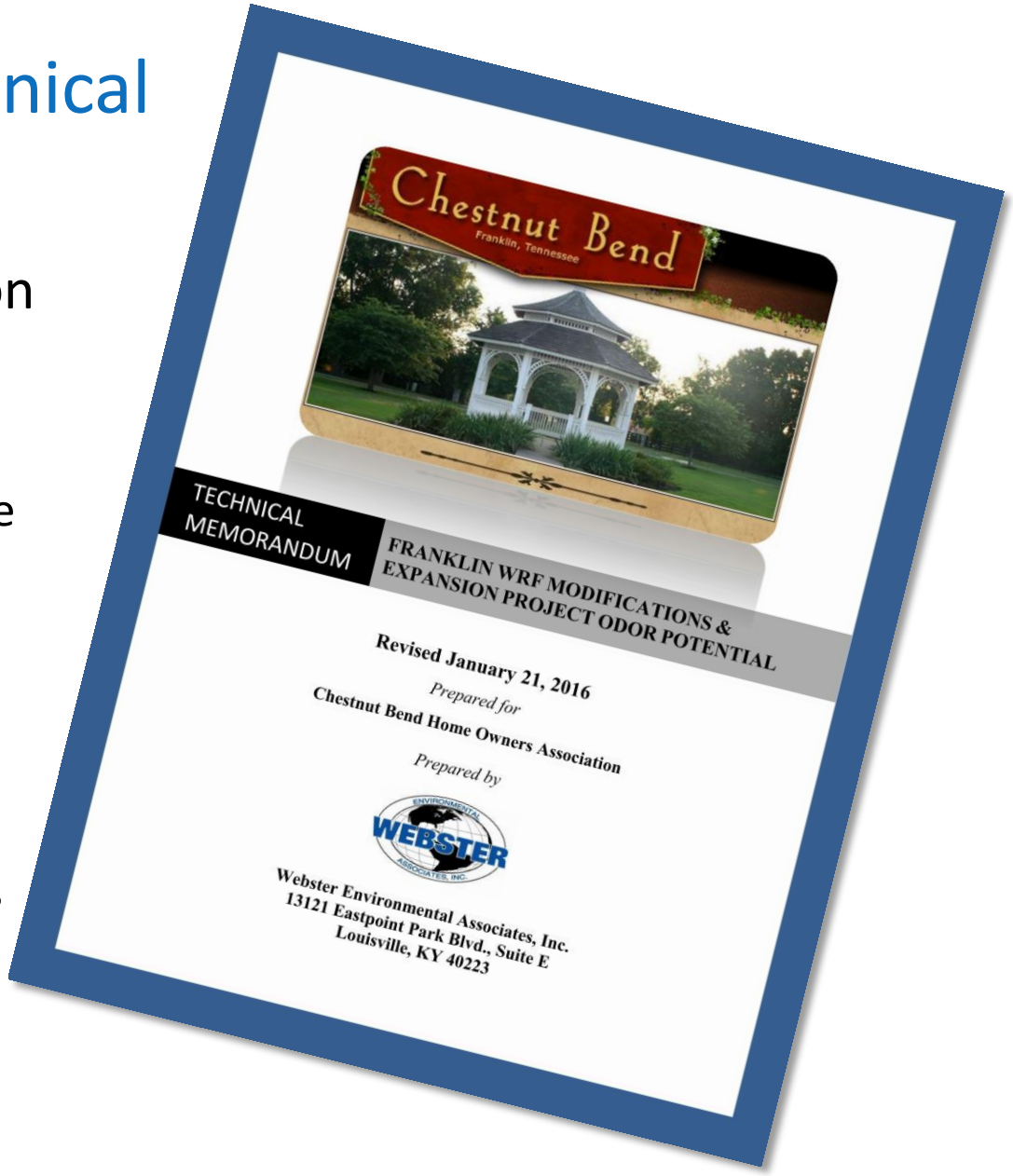


Solids Treatment – Solar Drying (cont.)

Review of WEA Technical Memorandum

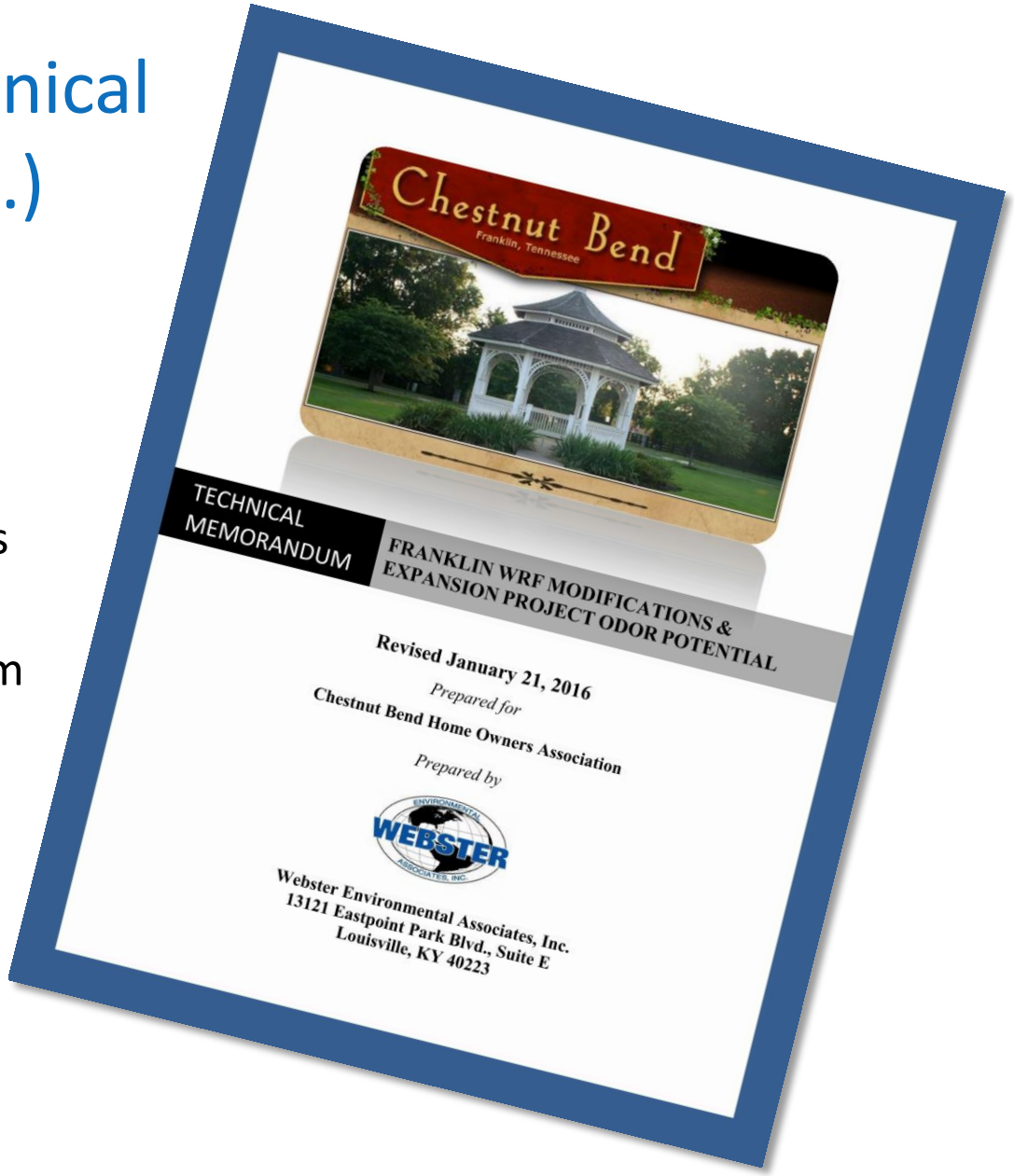
Review of WEA Technical Memorandum

- Odor Potential Discussion (Section 2.0)
  - Headworks system will be adequate to treat air source
  - Equalization tank system should provide excellent odor removal efficiencies



Review of WEA Technical Memorandum (cont.)

- Areas of Concern (Section 3.0)
  - Chemical scrubber for biosolids treatment areas
  - Thermal hydrolysis system
  - Solar drying system
  - Hauling of biosolids from Solids Processing Building to solar dryers
  - Sources of noise



Solids Treatment Odor Control System

- WEA Concerns:
  1. Scrubber systems require a significant amount of operator attention; operators rarely operate and maintain them as diligently as they should
  2. Without backup system, odors will be released untreated while scrubber is out of service for maintenance
  3. Scrubbers of this size use a lot of chemicals, which are expensive and potentially hazardous to operators; operators may reduce cost by operating at less than ideal conditions to reduce chemical usage
  4. This technology is less efficient at removing reduced sulfur compounds
  5. WEA recommends two stages of treatment to handle range of odorous compounds

Solids Treatment Odor Control System (cont.)

- <u>WEA Concern No. 1:</u> Scrubber systems require a significant amount of operator attention; operators rarely operate and maintain them as diligently as they should

- <u>Responses:</u>
  - The City has operated chemical scrubber systems onsite since 2001
  - System outages (i.e., power failures) not related to preventative maintenance have been rare
  - The City has operated the existing systems and will continue to operate and maintain the new system in accordance with the manufacturer's recommendations

Solids Treatment Odor Control System (cont.)

- <u>WEA Concern No. 2:</u> Without backup system, odors will be released untreated while scrubber is out of service for maintenance

- <u>Responses:</u>

  - Based on the City's experience with the existing system, outages are very rare

  - The City uses a managed maintenance process to perform routine and preventative maintenance twice per year

Solids Treatment Odor Control System (cont.)

- <u>WEA Concern No. 3:</u> Scrubbers of this size use a lot of chemicals, which are expensive and potentially hazardous to operators; operators may reduce cost by operating at less than ideal conditions to reduce chemical usage

- <u>Responses:</u>
  - The City has operated chemical scrubber systems onsite since 2001
  - The City has operated the existing systems and will continue to operate and maintain the new system in accordance with the manufacturer's recommendations
  - There is a cost with operating and maintaining any odor control system
  - During design of the odor control systems, scrubbers were selected based on odor control needs per process

Solids Treatment Odor Control System (cont.)

- WEA Concern No. 4: This technology is less efficient at removing reduced sulfur compounds (RSCs)

- Responses:

  - Chemical scrubbers are the industry standard for removal of RSCs

  - The specified two-stage scrubber provides for removal of RSCs
    - First stage removes hydrogen sulfide (H_2S)
    - Second stage removes removes residual H_2S and organic RSCs (ORSCs)

  - This is a significant upgrade compared to the 15 year old current system

Solids Treatment Odor Control System (cont.)

- WEA Concern No. 5: WEA recommends two stages of treatment to handle range of odorous compounds

- Response: The specified scrubber system provides two stages of treatment

Thermal Hydrolysis

- WEA Concern No. 1: No odor control is proposed; some odorous fugitive emissions are likely
  - Response: Detectable odors are unlikely

- WEA Concern No. 2: Little to no odor data available to WEA on THP; visiting the DC Water Blue Plains project would be beneficial in evaluating the odor potential
  - Responses:
    - The Blue Plains facility is not comparable to the proposed Franklin WRF facility because of their differences in size (capacity), layout, process design, and odor control system design
    - We have visited several facilities in Europe that are more comparable than the Blue Plains facility

Solar Dryer

- WEA Concerns:

1. No odor control is proposed for the system, which has the potential to emit odors through the roof exhaust

2. Selected supplier has no U.S.-specific odor data available to evaluate

3. Another vendor supplies odor control as standard, especially when near a residential area

4. Proposed location appears to be within close proximity to the Chestnut Bend neighborhood

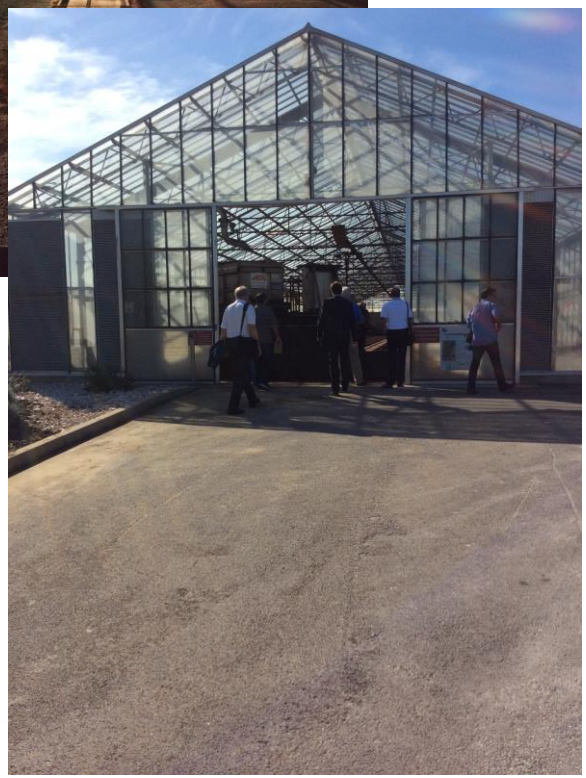
Solar Dryer (cont.)

- WEA Concern No. 1: No odor control is proposed for the system, which has the potential to emit odors through the roof exhaust

- Responses:
  - Since the product already meets Class A requirements, we don't anticipate significant biological activity/odor
  - The dryer vendor believes the product will not release odor
  - In the unlikely event of odors, the dryer ventilation design will greatly dilute them to non-detectable levels

Solar Dryer (cont.)

- <u>WEA Concern No. 2:</u> Selected supplier has no U.S.-specific odor data available to evaluate
- <u>Responses:</u>
  - There are no comparable solar drying facilities in the U.S. that process Class A sludges
  - The selected vendor has nearly 100 installations worldwide, mostly in Europe
  - Work by leading researchers shows that THP dewatered cake has a lower odor potential compared to cake from a conventional solids process



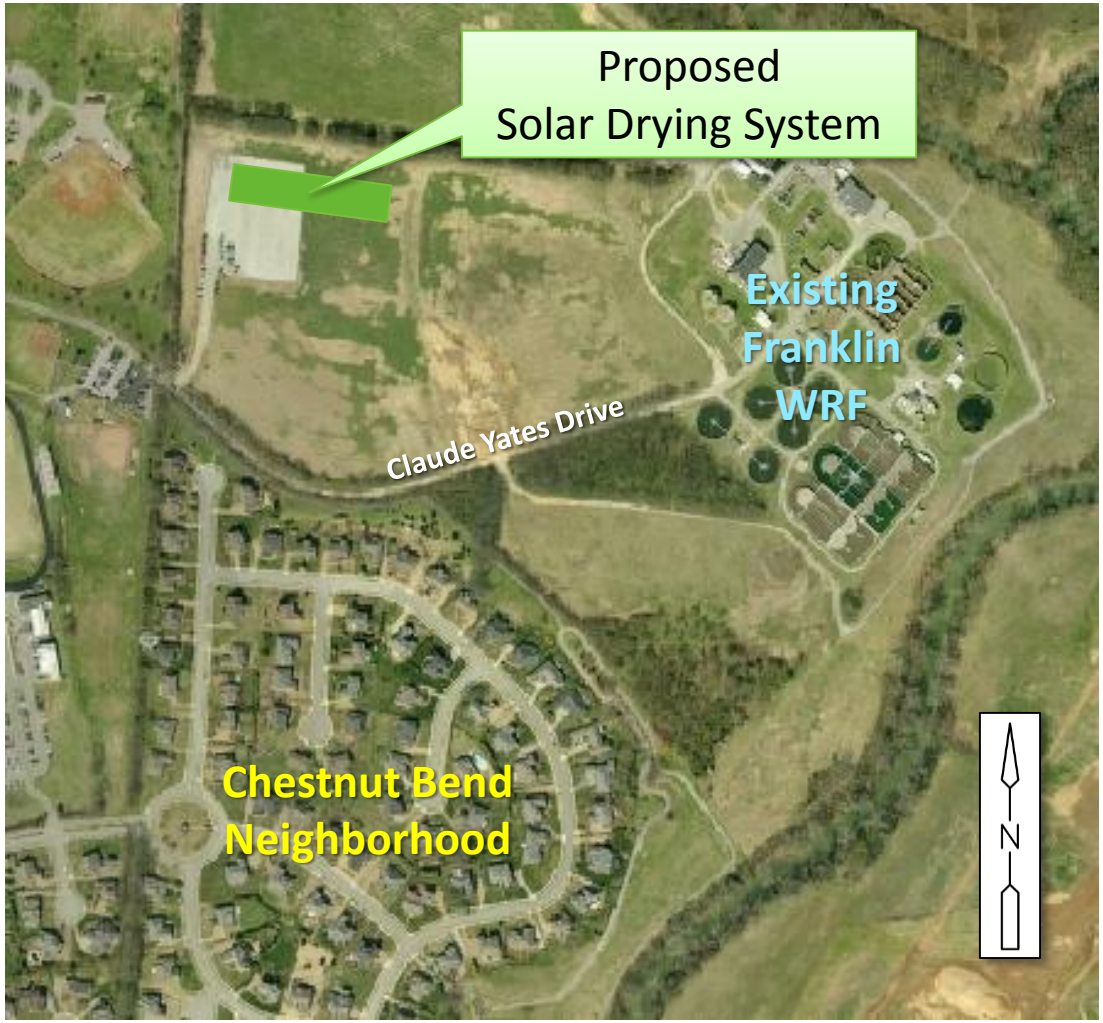
Solar Dryer (cont.)

- WEA Concern No. 3: Another vendor supplies odor control as standard, especially when near a residential area

- Responses:
  - None of the four vendors who submitted proposals for this project recommended odor control
  - Some vendors' systems have greater odor potential than others
    - Batch process (others) vs. continuous process (selected)
    - Forced ventilation (others) vs. natural ventilation (selected)
  - Many other installations are used to stabilize (treat) an unstabilized product, which has a much greater odor potential
  - The Franklin system will be used only for drying (volume reduction) of Class A biosolids

Solar Dryer (cont.)

- <u>WEA Concern No. 4:</u> Proposed location appears to be within close proximity to the Chestnut Bend neighborhood
- <u>Response:</u> The proposed solar dryer is approximately 700 feet from the closest house in Chestnut Bend



Biosolids Hauling

- WEA Concern:
  Trucking of sludge from post-dewatering to solar dryer has the potential to emit odors

- Responses:

  - The Class A stabilized sludge is expected to have little odor

  - Trucks will be covered

Sources of Noise

- <u>WEA Concern:</u> Most likely sources of noise

1. Trucks hauling post-dewatered cake to solar dryer
2. Trucks hauling dried sludge away from drying facility
3. Trucks delivering FOG to the plant
4. Front end loaders moving biosolids around at the solar dryer
5. THP system equipment pumps, relief valves, and other equipment

Sources of Noise (cont.)

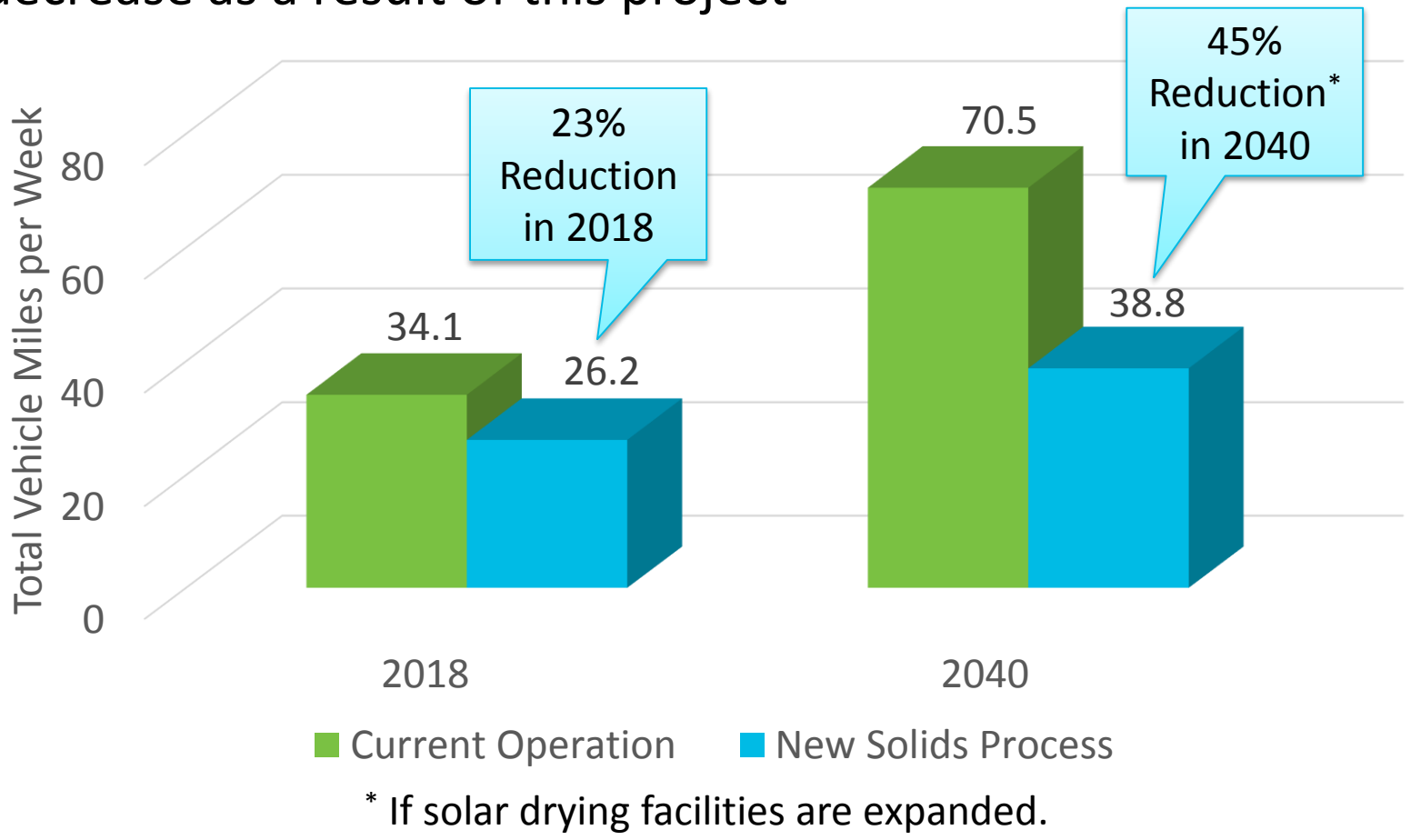
- WEA Concerns 1, 2 and 3: Truck traffic
- Response: The projected average volume of truck traffic will decrease as a result of this project

Year	Current Solids Process (trucks/ week)	New Solids Treatment Process (trucks/week)				
		Cake to Solar Dryer	Cake to Farms	Dried Sludge Leaving Facility	FOG Deliveries	Total Trucks
2018	**22**	4	2	2	10	**18**
2040	**45**	4 (11*)	7 (0*)	2 (5*)	15	**28 (31*)**

* If solar drying facilities are expanded.

Sources of Noise (cont.)

- The projected weekly vehicle miles traveled (on plant property and to/from Hillsborough Road) will also decrease as a result of this project



* If solar drying facilities are expanded.

Sources of Noise (cont.)

- <u>WEA Concern No. 4:</u> Front end loaders at the solar dryer

- <u>Responses:</u>

  - Dried solids will be hauled from the solar dryer one day every two weeks

  - Loading will only take place during business hours, and only on weekdays

Sources of Noise (cont.)

- <u>WEA Concern No. 5:</u> THP system equipment

- <u>Responses:</u>

  - The pumps are small (5 horsepower)

  - Sounds of steam injection and valves opening/closing should be inaudible to neighbors

Questions and Discussion